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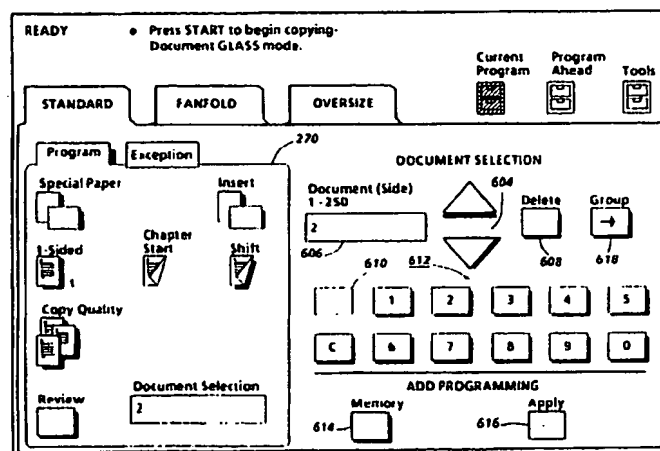
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(54) Exception memory feature.

(57) An exception programming device in a reproduction machine capable of being programmed for a production run for producing a first plurality of copies of a document set having a common set of features and a second plurality of copies of the document set having selected features that are exceptions to the common set of features including the steps of programming the machine to provide said

first features to pre-determined documents of the document set, automatically storing in memory indications of the programmed first features, selectively identifying a pre-determined second feature, automatically storing in memory an indication of the programmed second feature, and selectively applying the second feature to pre-determined documents of the document set.

**FIG. 6****EP 0 482 311 A1**

## RELATED APPLICATION

U.S. Application Serial No. 317363 filed March 1, 1989 and entitled EXCEPTION GROUPING FOR MACHINE PROGRAMMING and assigned to the assignee herein.

The invention relates to a system for programming reproduction machines such as copiers and printers, and more particularly, to method for job feature exception programming for such reproduction machines.

As reproduction machines such as copiers and printers become more complex and versatile in the jobs they can do, the user interface between the machine and the operator or user, which in essence permits the dialogue between operator and machine, must necessarily be expanded if full and efficient utilization of the machine is to be realized. A suitable interface must not only provide the controls, displays, and messages necessary to activate, program, monitor, and maintain the machine, but must be able to accurately and efficiently program into the machine instructions for a complex reproduction run. Such reproduction runs generally include a set of documents with most of the documents requiring common features. However, often several documents of the set require special features or exceptions to the common features of most of the documents of the set. This requires operator attention and selection to program the exceptions for each such document requiring an exception.

Various prior art techniques are directed to operator entry of exception information, for example:

U.S. Patent No. 4,627,715 to Kikuno discloses a programmable copier capable of making copies from a plurality of originals in accordance with copy information temporarily stored in a memory. The copier is provided with a CPU for checking the total number of copies to be made for a copy job;

U.S. Patent No. 4,693,590 to Umeda discloses an electronic copier selectively operable in a multi-job mode for continuously copying a plurality of groups of documents which differ in copying condition from each other. In response to a copy start signal, single display means displays job data associated with one group of documents which are to be copied;

U.S. Patent No. 4,711,560 to Hosaka et al. discloses an image processing apparatus having a removable medium containing programs for controlling the apparatus so that the apparatus is capable of performing multiple functions by means of the programs. The programs are controllable by a monitor program provided in the apparatus;

U.S. Patent No. 4,673,281 to Suzuki discloses an image forming apparatus having a memory for

registering copying information. One registration of a plurality of registered copying information is read out and a copying operation is executed in accordance therewith. The copying information registered in the memory is updateable;

U.S. Patent No. 4,453,821 to Smith discloses a set-up recall apparatus for configuring a copier prior to a production run. The apparatus includes a programmable, non-volatile memory which stores information corresponding to different set-up configurations and a mechanism for selecting one of these configurations and for configuring the copier in accordance therewith;

U.S. Patents Nos. 4,618,246 to Nagashima et al., 4,734,739 to Inuzuka et al. and 4,760,608 to Suzuki all disclose image forming devices which contain programmable memories for controlling image formation in accordance with parameters set in a memory.

It is also known as disclosed in co-pending U.S. Application Serial No. 317363 filed March 1, 1989 and entitled EXCEPTION GROUPING FOR MACHINE PROGRAMMING to be able to program exception features for a job requirement on a document sheet by document sheet basis. This is generally accomplished by scrolling through the document set by document number and applying feature exceptions to each document, either individually or in groups.

A difficulty with the prior art systems is that the exceptions are applied to each document as the documents are identified on an individual basis. Often, however, an operator needs to apply a given feature to a given set of the documents, rather than having to identify each document individually and then specifically apply the exception feature to each document individually. It would be preferable, to be able to identify the exception feature once, and then apply the feature to selected documents without the need to continually re-select the feature.

It is an object of the present invention, therefore, to provide a new and improved technique for selecting programming exceptions to the standard features in a document set job requirement, and in particular, to provide icon selectors on a user interface screen to be able to program exceptions to documents on a feature basis rather than on a document basis. Further advantages of the present invention will become apparent as the following description proceeds and the features characterizing the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

## SUMMARY OF THE INVENTION

Briefly, the present invention is concerned with an exception programming device in a reproduction machine capable of being programmed for a production run for producing a first plurality of copies of a document set having a common set of features and a second plurality of copies of the document set having selected features that are exceptions to the common set of features including the steps of programming the machine to provide said first features to pre-determined documents of the document set, automatically storing in memory indications of the programmed first features, selectively identifying a pre-determined second feature, automatically storing in memory an indication of the programmed second feature, and selectively applying the second feature to pre-determined documents of the document set. For a better understanding of the present invention, reference may be had to the accompanying drawings wherein the same reference numerals have been applied to like parts and wherein:

## IN THE DRAWINGS

Figure 1 is an isometric view of an illustrative reproduction machine incorporating the touch dialogue User Interface (U.I.) of the present invention;

Figure 2 is a schematic elevational view depicting Various operating components and sub-systems of the machine shown in Figure 1;

Figure 3 is a block diagram of the operating control systems and memory for the machine shown in Figure 1;

Figure 4 is a front view of the U.I. color touch monitor showing the soft button display screen and hard button control panel;

Figure 5 is a front view of the touch monitor screen with the principal elements of the soft touch dialogue displayed;

Figure 6 is a front view of the touch monitor screen shown in Figure 6 depicting the touch selection exception programming icons in accordance with the present invention; and

Figures 7A and 7B are a flow chart of the programming of exceptions by feature in accordance with the present invention.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to Figures 1 and 2, there is shown an electro-photographic reproduction machine 5 composed of a plurality of programmable components and subsystems which cooperate to carry out the copying or printing job programmed through a touch dialogue User Interface (U.I.). Machine 5

employs a photoconductive belt 10. Belt 10 is entrained about stripping roller 14, tensioning roller 16, idler rollers 18, and drive roller 20. Drive roller 20 is rotated by a motor coupled thereto by suitable means such as a belt drive. As roller 20 rotates, it advances belt 10 in the direction of arrow 12 through the various processing stations disposed about the path of movement thereof.

Initially, the photoconductive surface of belt 10 passes through charging station A where two corona generating devices, indicated generally by the reference numerals 22 and 24 charge photoconductive belt 10 to a relatively high, substantially uniform potential. Next, the charged photoconductive belt is advanced through imaging station B. At imaging station B, a document handling unit 26 sequentially feeds documents from a stack of documents in a document stacking and holding tray into registered position on platen 28. A pair of Xenon flash lamps 30 mounted in the optics cavity illuminate the document on platen 28, the light rays reflected from the document being focused by lens 32 onto belt 10 to expose and record an electrostatic latent image on photoconductive belt 10 which corresponds to the informational areas contained within the document currently on platen 28. After imaging, the document is returned to the document tray via a simplex path when either a simplex copy or the first pass of a duplex copy is being made or via a duplex path when a duplex copy is being made.

The electrostatic latent image recorded on photoconductive belt 10 is developed at development station C by a magnetic brush developer unit 34 having three developer rolls 36, 38 and 40. A paddle wheel 42 picks up developer material and delivers it to the developer rolls 36, 38. Developer roll 40 is a cleanup roll while a magnetic roll 44 is provided to remove any carrier granules adhering to belt 10.

Following development, the developed image is transferred at transfer station D to a copy sheet. There, the photoconductive belt 10 is exposed to a pre-transfer light from a lamp (not shown) to reduce the attraction between photoconductive belt 10 and the toner powder image. Next, a corona generating device 46 charges the copy sheet to the proper magnitude and polarity so that the copy sheet is tacked to photoconductive belt 10 and the toner powder image attracted from the photoconductive belt to the copy sheet. After transfer, corona generator 48 charges the copy sheet to the opposite polarity to detach the copy sheet from belt 10.

Following transfer, a conveyor 50 advances the copy sheet bearing the transferred image to fusing station E where a fuser assembly, indicated generally by the reference numeral 52 permanently

affixes the toner powder image to the copy sheet. Preferably, fuser assembly 52 includes a heated fuser roller 54 and a pressure roller 56 with the powder image on the copy sheet contacting fuser roller 54.

After fusing, the copy sheets are fed through a decurler 58 to remove any curl. Forwarding rollers 60 then advance the sheet via duplex turn roll 62 to gate 64 which guides the sheet to either finishing station F or to duplex tray 66, the latter providing an intermediate or buffer storage for those sheets that have been printed on one side and on which an image will be subsequently printed on the second, opposed side thereof. The sheets are stacked in duplex tray 66 face down on top of one another in the order in which they are copied.

To complete duplex copying, the simplex sheets in tray 66 are fed, in seriatim, by bottom feeder 68 back to transfer station D via conveyor 70 and rollers 72 for transfer of the second toner powder image to the opposed sides of the copy sheets. The duplex sheet is then fed through the same path as the simplex sheet to be advanced to finishing station F.

Copy sheets are supplied from a secondary tray 74 by sheet feeder 76 or from the auxiliary tray 78 by sheet feeder 80. Sheet feeders 76, 80 are friction retard feeders utilizing a feed belt and take-away rolls to advance successive copy sheets to transport 70 which advances the sheets to rolls 72 and then to transfer station D.

A high capacity feeder 82 is the primary source of copy sheets. Tray 84 of feeder 82, which is supported on an elevator 86 for up and down movement, has a vacuum feed belt 88 to feed successive uppermost sheets from the stack of sheets in tray 84 to a take away drive roll 90 and idler rolls 92. Rolls 90, 92 guide the sheet onto transport 93 which in cooperation with idler roll 95 and rolls 72 move the sheet to transfer station D.

After transfer station D, photoconductive belt 10 passes beneath corona generating device 94 which charges any residual toner particles remaining on belt 10 to the proper polarity. Thereafter, a pre-charge erase lamp (not shown), located inside photoconductive belt 10, discharges the photoconductive belt in preparation for the next charging cycle. Residual particles are removed from belt 10 at cleaning station G by an electrically biased cleaner brush 96 and two de-toning rolls 98 and 100.

The various functions of machine 5 are regulated by a controller which preferably comprises one or more programmable microprocessors. The controller provides a comparison count of the copy sheets, the number of documents being recirculated, the number of copy sheets selected by the

operator, time delays, jam corrections, etc.. As will appear, programming and operating control over machine 5 is accomplished through a User Interface. Operating and control information, job programming instructions, etc. are stored in a suitable memory which includes both ROM and RAM memory types. Conventional sheet path sensors or switches may be utilized to keep track of the position of the documents and the copy sheets. In addition, the controller regulates the various positions of the gates depending upon the mode of operation selected.

With reference to Figure 3, memory 115 includes a hard or rigid disk drive 115A and a floppy disk drive 115B connected to Controller 114. In a preferred embodiment, the rigid disks are two platter, four head disks with a formatted storage capacity of approximately 20 megabytes. The floppy disks are 3.5 inch, dual sided micro disks with a formatted storage capacity of approximately 720 kilobytes. Preferably, all of the control code and screen display information for the machine is loaded from the rigid disk at machine power up. Changing the data that gets loaded into the machine for execution can be done by exchanging the rigid disk in the machine 5 for another rigid disk with a different version of data or by modifying the contents of the current rigid disk by transferring data from one or more floppy disks onto the rigid disk using the floppy disk drive built into the machine 5. Suitable display 213A of U.I. 213 is also connected to Controller 114 as well as a shared line system bus 302.

The shared line system bus 302 interconnects a plurality of core printed wiring boards including an input station board 304, a marking imaging board 306, a paper handling board 308, and a finisher/binder board 310. Each of the core printed wiring boards is connected to local input/output devices through a local bus. For example, the input station board 304 is connected to digital input/output boards 312A and 312B and servo board 312C via local bus 314. The marking imaging board 306 is connected to analog/digital/analog boards 316A, 316B, digital input/output board 316C, and stepper control board 316D through local bus 318. In a similar manner, the paper handling board 308 connects digital input/output boards 320A, B and C to local bus 322, and finisher/binder board 310 connects digital input/output boards 324A, B and C to local bus 326.

Referring to Figure 4, there is shown the color touch monitor 214 for the touch dialogue U.I. 213 of the present invention. As will appear, monitor 214 provides an operator user interface with hard and soft touch control buttons enabling communication between operator and machine 10. Monitor

214 comprises a suitable color cathode ray tube 216 of desired size and type having a peripheral framework forming a decorative bezel 218 thereabout. Bezel 218 frames a rectangular video display screen 220 on which soft touch buttons in the form of icons or pictograms and messages are displayed as will appear together with a series of hard control buttons 222 and 10 seven segment displays 224 therebelow. Displays 224 provide a display for copy "Quantity Selected", copy "Quantity Completed", and an area 226 for other information.

Hard control buttons 222 comprise "0-9" buttons providing a keypad 230 for programming copy quantity, code numbers, etc.; a clear button "C" to reset display 224; a "Start" button to initiate print; a clear memory button "CM" to reset all dialogue mode features to default and place a "1" in the least significant digit of display 224; an "Unload Stacker" button requesting transfer of the contents of stacker 128; a "Stop" button to initiate an orderly shutdown of machine 5; a "Binder Warm-up" button to initiate warm-up of binder 126; an "Interrupt" button to initiate a job interrupt; a "Proof" button to initiate making of a proof copy; an "End Job" button to end the current job; and an "i" button to initiate a request for information.

Referring now to Figure 5, for dialogue purposes, screen 220 of monitor 214 is separated into five basic display areas, identified as a message area 232, a dialogue mode selection area 234, a dialogue pathway selection area 236, a scorecard selection area 238, and a work selection area 240.

Message area 232 consists of 3 lines 241 located at the top of screen 220. In addition, two programming conflict message lines 246 are provided in work selection area 240. The dialogue mode selection area 234 comprises an active area containing certain top level dialogue mode controls available to the operator. The mode controls are soft touch buttons 250-0, 250-1, and 250-2 in the form of icons representing file cabinets located on the right side of the screen 220 directly below message area 232.

The dialogue pathway selection area 236 and the scorecard selection area 238 basically simulate a card within a card filing system with primary dialogue pathway file folders 260 and secondary file cards, the latter being referred to as scorecards 270. As will appear, scorecards 270 provide additional programming pathway options. File folders 260 and scorecards 270 are arranged in overlaying relation one in front of the other. The dialogue pathway file folders 260, which are located beneath message area 232 and which extend up into the dialogue mode area 234, each have an outwardly projecting touch tab 262 along the top edge identifying the dialogue pathway represented by the

folder, as for example STANDARD, FANFOLD, OVERSIZED, etc.. To allow the file folders 260 to be distinguished from one another without the need to reshuffle the folders each time it is desired to display a folder hidden behind the folder currently displayed, each tab 262 is offset from the other so that tabs 262 are always visible whatever folder is displayed.

Scorecard selection area 238 appears in the lower left corner of screen 220 beneath dialogue selection area 234 and extends to the border of work selection area 240. Scorecard selection area 238 contains a file of scorecards 270 which present the features (first level program selections) available with each of the dialogue pathway file folders 260. As seen in Figure 5 for example, area 238 displays the features (first level program selections) resident with the currently selected scorecard, such selections remaining at previously selected options until either timeout or the "CM" button (Figure 4) is pressed. Two or three scorecards 270 are typically provided, depending on the dialogue pathway file folder 260 selected. Scorecards 270 each comprise a relatively small file card arranged in overlaying relation to one another so as to simulate a second but smaller card file. Each scorecard 270 has a touch tab 272 displaying the programming pathway options available with the scorecard, such as PROGRAM, EXCEPTION, etc.. Scorecard tabs 272 are offset from one another to enable the identity of each scorecard to be determined whatever its position in the scorecard file. Additionally, scorecard tabs 272 are shaped different than the dialogue pathway file folder tabs 262 to prevent confusion.

Work selection area 240 appears in the lower right portion of screen 220, area 240 being beneath the dialogue pathway area 236 and extending from the edge of scorecard selection area 238 to the right side of screen 220. The top two lines 246 of the work selection area 240 are reserved for programming conflicts and prompts with the remaining area used for displaying the feature options (second level program selections) available with the first level program selection that is touched on the scorecard currently selected, an example of which is seen in Figure 18. As will appear, the operator can scan and make a selection within the work area or pick another scorecard item.

In order for the soft touch buttons (i.e., icons) on screen 220 to provide information regarding both their current selection state and their current status, a display convention is provided that will allow the operator to quickly scan the display and determine current feature selections. Referring to Table 1, unselected features that are selectable are indicated by an outlined icon with a shadowed background while selected features that are selectable are indicated by a color-filled icon with a

shadowed background. Unselected features that are not selectable are indicated by an outlined icon without a shadowed background while selected features that are not selectable are indicated by a color-filled icon without a shadowed background.

In cases where an unselected feature that is not selectable is touched, a message will be displayed in the programming conflict area 246 of screen 220. There are five operating states for U.I. 213 consisting of (1) CURRENT JOB, (2) PROGRAM AHEAD (3) TOOLS, (4) FAULTS, and (5) INFORMATION. The INFORMATION state is entered by means of a hard control button "i" on bezel 218 while the FAULTS state is in the form of a file card that overlays the file cards currently displayed in the event of a fault. The CURRENT JOB, PROGRAM AHEAD, and TOOLS states are entered by pressing the soft touch buttons 250-0, 250-1 and 250-2 respectively displayed on screen 220 in the Dialogue Mode Selection area 234.

For purposes of discussing the Feature Exception Programming feature of the present invention, U.I. 213 is presumed to be in the CURRENT JOB state as a result of actuation of soft touch button 250-0. The functions of this state are to inform the operator of the daily tasks that are necessary to keep machine 5 in good working order, to allow the operator to program feature selections for the current job, and to allow the operator to run a copying job. The CURRENT JOB state is sub-divided into three cases: (1) "Job Complete", (2) "Print", and (3) "Job Incomplete". "Job Complete" implies that a job is not in progress and has been completed, "Print" refers to a job in progress, and "Job Incomplete" refers to a job in progress that has either voluntarily or involuntarily been stopped or interrupted.

The CURRENT JOB state can exit to the PROGRAM AHEAD state by touching the PROGRAM AHEAD button 250-1 in any of the "Job Complete", "Job Incomplete" or "Print" cases; or can exit to the INFORMATION state by pressing the "i" hard button on bezel 218; or can exit to the TOOLS state by touching the TOOLS soft touch button 250-2 in either the "Job Complete" or "Job Incomplete" cases. In addition the CURRENT JOB state will automatically enter the FAULT state when a fault occurs.

When entered in the CURRENT JOB state, the dialogue pathway file folders 260 tabbed STANDARD, OVERSIZED, and FANFOLD are displayed providing various dialogue pathway selections in the form of scorecards 270. The function and the behavior of these tabbed file folders within the dialogue pathway selection area 236 for the "Job Complete", "Job Incomplete", and "Print" cases as well as further details of the above described sys-

tem are further described in D/87184, application Serial Number 07/164,365 filed March 3,1988 and incorporated herein.

With reference to Figure 6, a second scorecard 270 tabbed EXCEPTION is also included with the STANDARD dialogue pathway file folder.. This scorecard permits unique programming, referred to herein as exception programming, for individual pages of pages within a job. The Exception Programming features are accessed by pressing the EXCEPTION tab which causes both the EXCEPTION scorecard to appear in the features selection area 238 of screen 222 and a Document Selection Work Area to appear in work selection area 240.

The Document Selection work area provides Document Selection Scroll Buttons 604 to allow the operator to select a desired page number, the selected page number being shown in DOCUMENT (SIDE) Window 606, and a DELETE Button 608 to permit the operator to delete the selected page number.

The EXCEPTION programming scorecard displays a DOCUMENT SELECTION icon 600 to provide the operator with access to the Document Selection work area and display the number of the page currently being displayed in the scorecard. This icon is unavailable in the "Job Incomplete" and "Print" cases. There is also displayed a SHIFT icon 628, a COPY QUALITY icon 630, a 1 SIDED icon 632 to function in a similar manner as the SIDES IMAGED icon 310 in the PROGRAM scorecard, an INSERT icon 634 to allow the operator to select the tray from which inserts will be fed (NON IMAGED), a SPECIAL PAPER icon 636 to allow the user to select the tray from which the paper will be fed for copying and a CHAPTER START icon 638 to allow the operator to designate that the beginning of a chapter in a 1:2 Sides-Imaged program should be printed face-up.

A GROUP Button 618 permits the operator, after a page number is entered, to expand to a group of pages. When button 618 is pressed, an arrow appears in page window 606 and the scroll buttons 604 now act upon numbers in the right side of the window. With reference to Figure 6, upon designating exception programming, the score card area 270 will appear with the special paper, insert, one-sided, chapter start, shift, and copy quality icons as illustrated and also the document Selection Button 600. Automatically, the number 1 will appear in the Document Window 606 in the work area enabling the operator to select any specific exception for document 1. If no exception is intended for document 1, the operator will then scroll up with the Scroll Buttons 604 to document 2, etc. until reaching a document number requiring an exception. After making the appropriate selections for the exception for the document displayed in the

*select page*

*main conventions*

window 606 (selections automatically stored in the machine control), the operator will key the document Selection Button 600 in the scorecard area to return back to the work area, to then scroll up or down with the Scroll Buttons 604.

With reference to Figure 6 in accordance with the present invention, there are illustrated a memory icon 614 and an apply icon 616 as well as an enter button 610 and 10 numeral input buttons as illustrated at 612. By including the memory icon 614 on the exception programming page selection display, the operator is able to select a feature or set of features to be associated with this memory icon. The apply icon, 616 can then be used to copy the features stored in memory to a current document for example document #2. Memory is programmed exactly the same way as a document requiring an exception, only the programming doesn't correspond to any particular document number until "apply" is selected. Features in use on the current original are over written only if that feature is associated with the memory icon 614. This is necessary to allow features to be programmed individually without affecting already existing exceptions.

For example, if a job is required to be programmed for special paper for originals 3, 5 and 7 as well as special copy quality for originals 2, 5 and 9, the operator can program special paper in Memory and then apply the special memory feature to originals 3, 5 and 7. The operator can then program the special copy quality into memory (and remove the special paper selection from memory) and apply this to documents 2, 5 and 9. The net result will be to not disturb the special paper selection on page 5 because only features programmed in memory have an effect on the exception when the apply icon 616 is selected.

These features are further illustrated with respect to the flow charts of Figures 8 and 9. In the flow charts, A represents a point at which the flow chart is entered and A' represents the point at which the flow chart is exited. At A', the remainder of the algorithm executes until point A is reached again. In general, the first part of the algorithm is the procedure for placing features in memory. If there is no feature in memory, then it is not possible to apply a feature by the use of apply icon 616. The second part of the flow chart is to apply the features in memory to selected document numbers. In a preferred embodiment, it is only possible to apply those features in memory to selected documents.

With reference to the flow charts, there is first a determination if the memory is selected. If yes, the document display is replaced with a memory display. This display shows current memory features, if any, in the score card. The next decision

block is to determine if the document number has been changed. If yes, there is a replace memory with document display operation. There is then a feature stored decision to be made. If features are stored, there is a display shadow on the apply icon operation.

If no document number has been changed, there is then a determination if a feature has been altered. If the feature has been altered, there is a store new exception feature in special memory area operation and a return to a determination if the document number has been changed. As illustrated in Figure 9, if the memory icon has not been selected, or if no features have been stored or a remove display shadow on apply icon operation has taken place, there is an apply selected decision. If the apply selected icon 616 has been selected, for each feature stored in memory, there is a replacement of current documents exception features. After the current documents have been itemized for the features stored in memory, or if the apply icon has not been selected there is a return to a document number change decision block. If the document number has changed there is a return to the apply selected decision block.

While the invention has been described with reference to the structure disclosed, it is not confined to the details set forth, but is intended to cover such modifications or changes as may come within the scope of the following claims.

## Claims

1. In a reproduction machine having a control and memory for providing a set of reproductions of a document set, the reproductions generally having first features, the method of selecting pre-determined documents of the document set to receive second features different from said first features including the steps of:
  - programming the machine to provide said first features to pre-determined documents of the document set,
  - automatically storing in memory indications of the programmed first features,
  - selectively identifying a pre-determined second feature,
  - automatically storing in memory an indication of the programmed second feature, and
  - selectively applying the second feature to pre-determined documents of the document set.
2. An exception programming device in a reproduction machine having a control and plural interactive subsystems cooperable to produce copies from document originals, some of the copies having standard features, other of the

copies having features different from the standard features comprising:

a screen providing a display of programming selections to select exceptions by feature for each document to be copied;

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input responsive means to enable the programming selections to be identified and entered into the control;

said display and input responsive means including a first set of switches to enter an exception feature for a first set of selected documents and a second set of switches to enter an exception feature for a second set of documents, the first and second sets including a common document.

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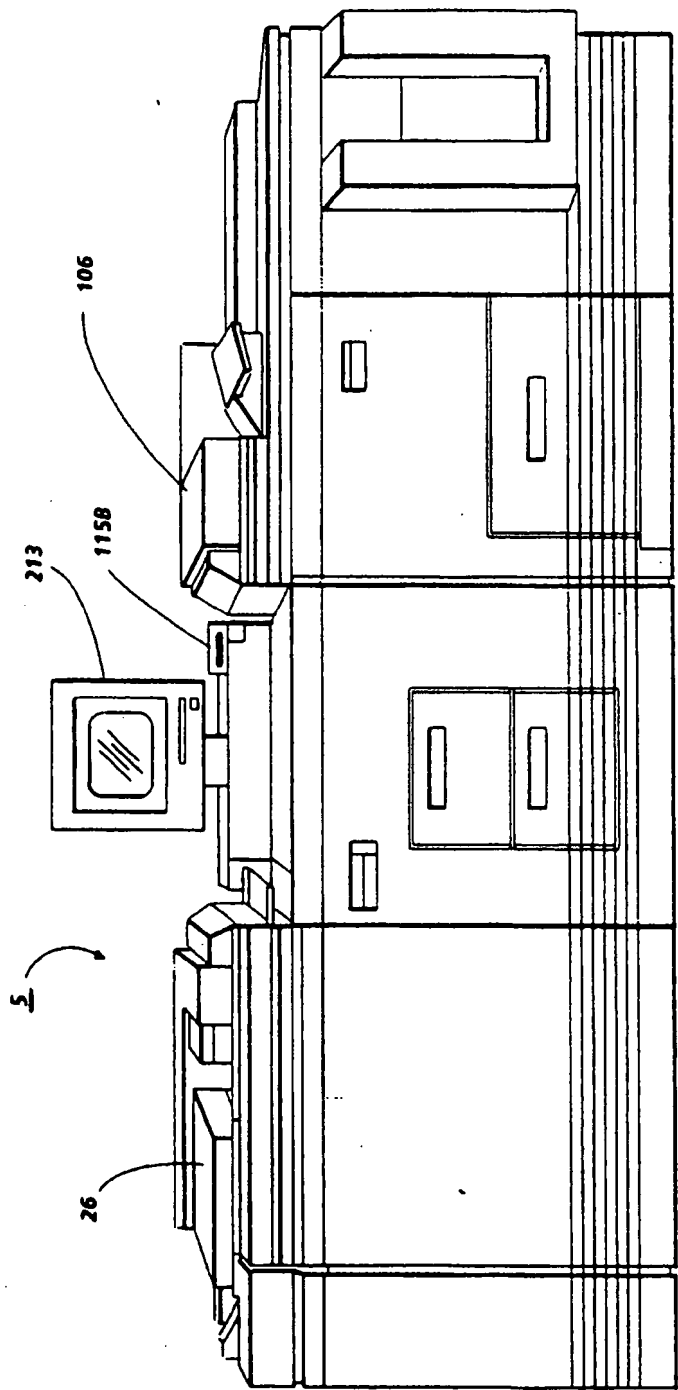
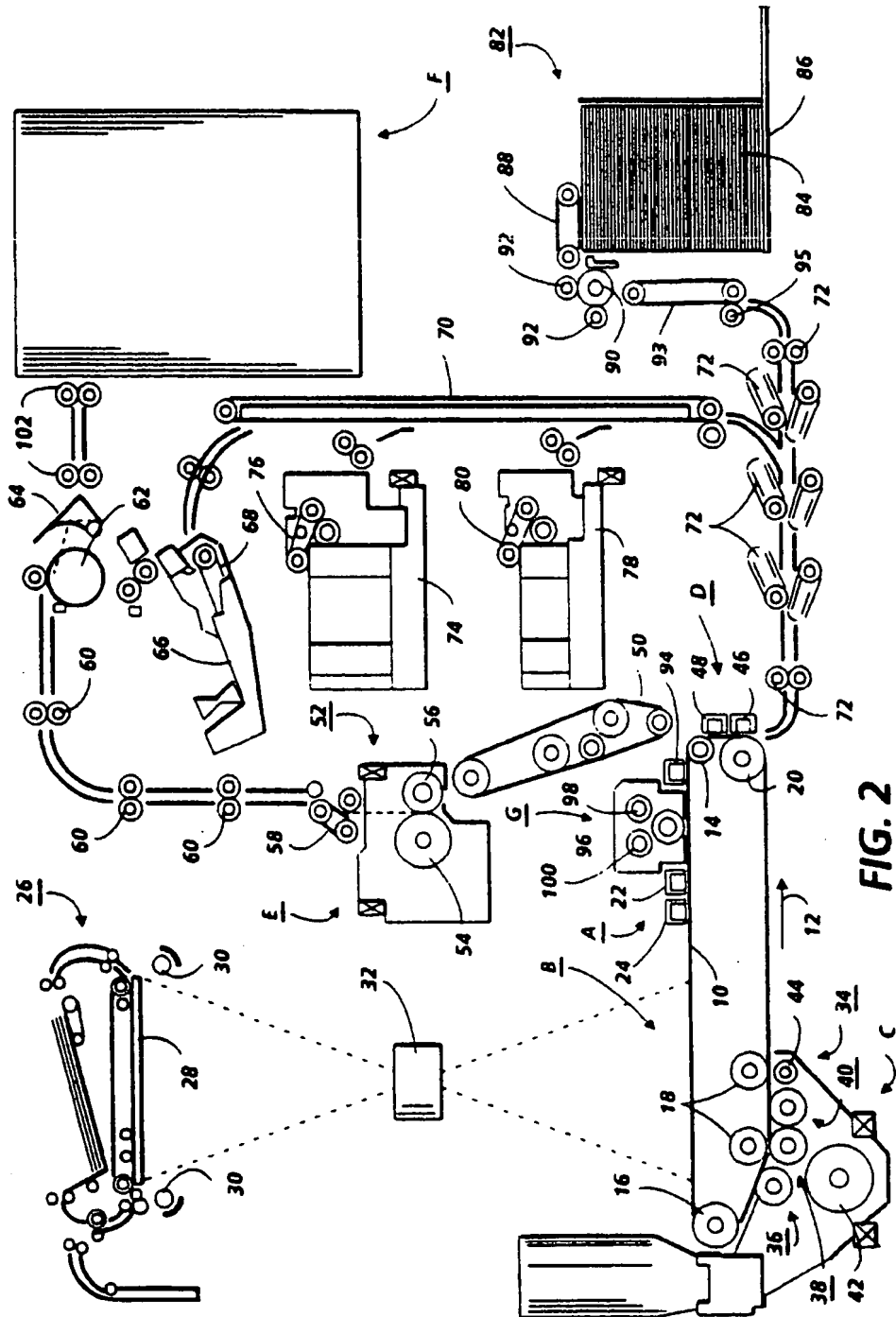


FIG. 1



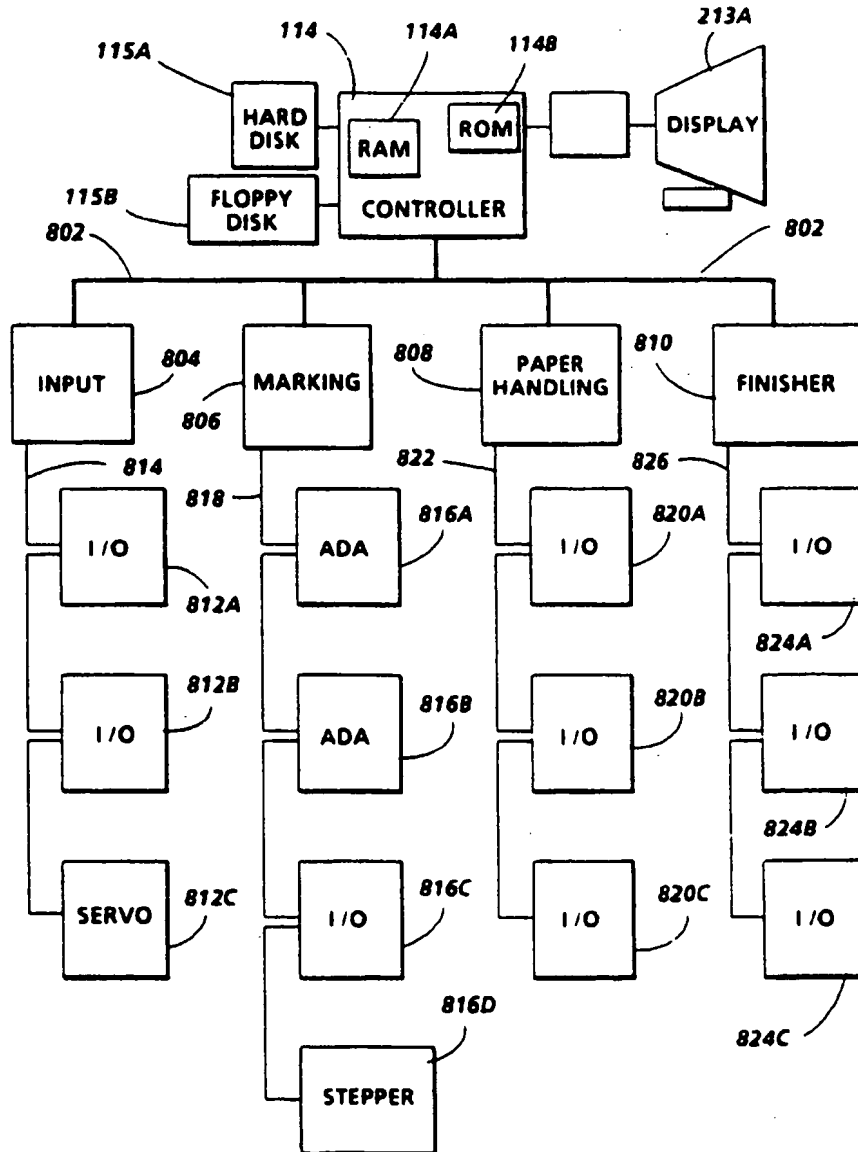
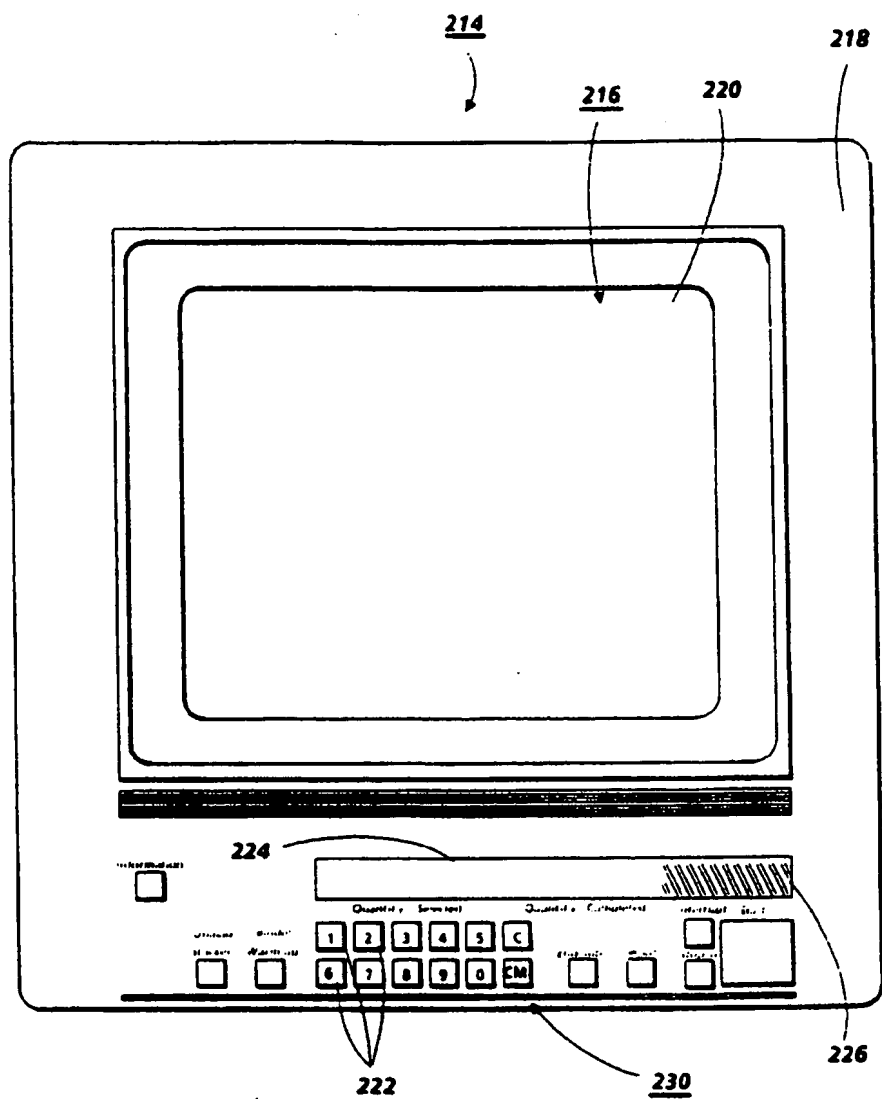


FIG. 3



**FIG. 4**

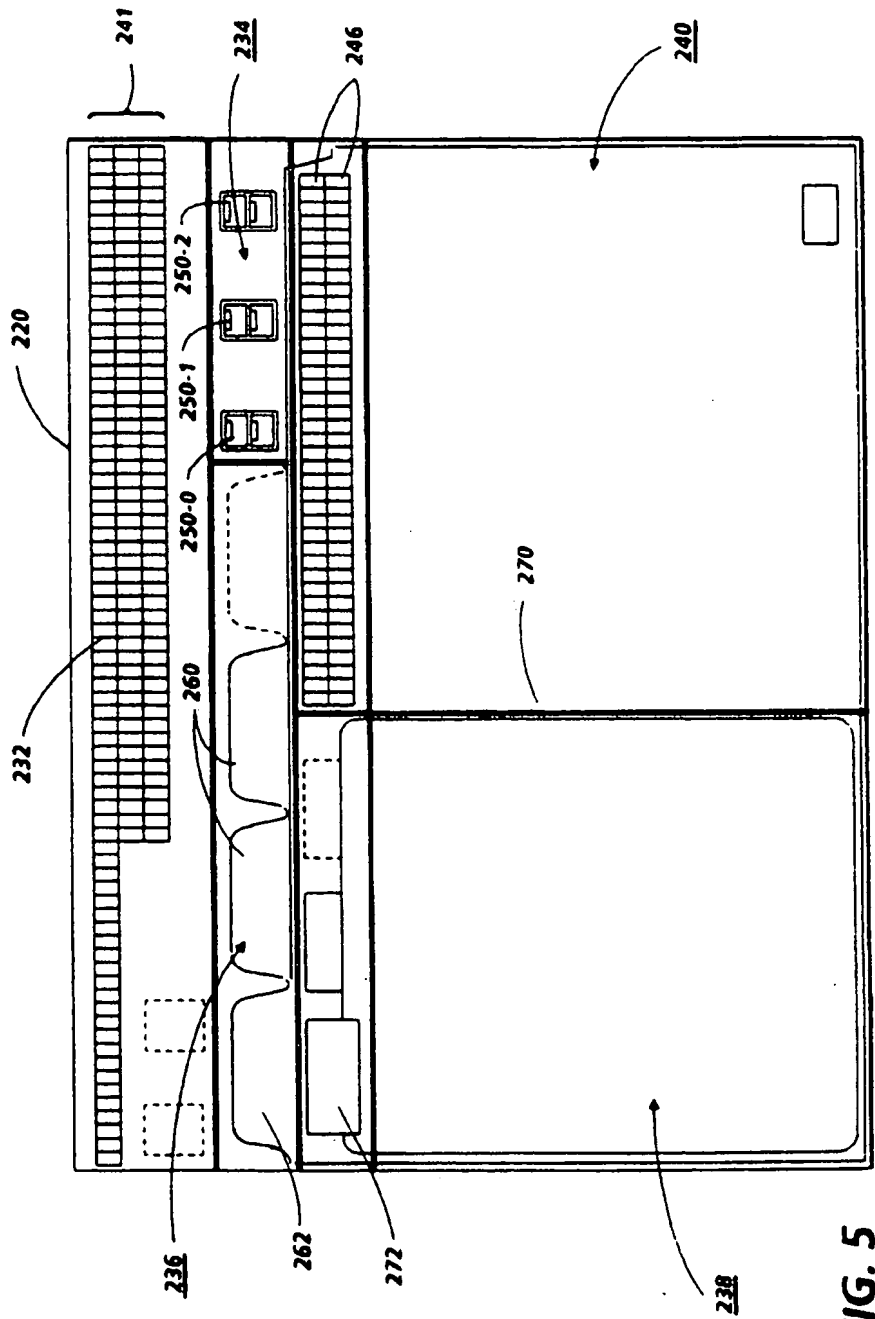


FIG. 5

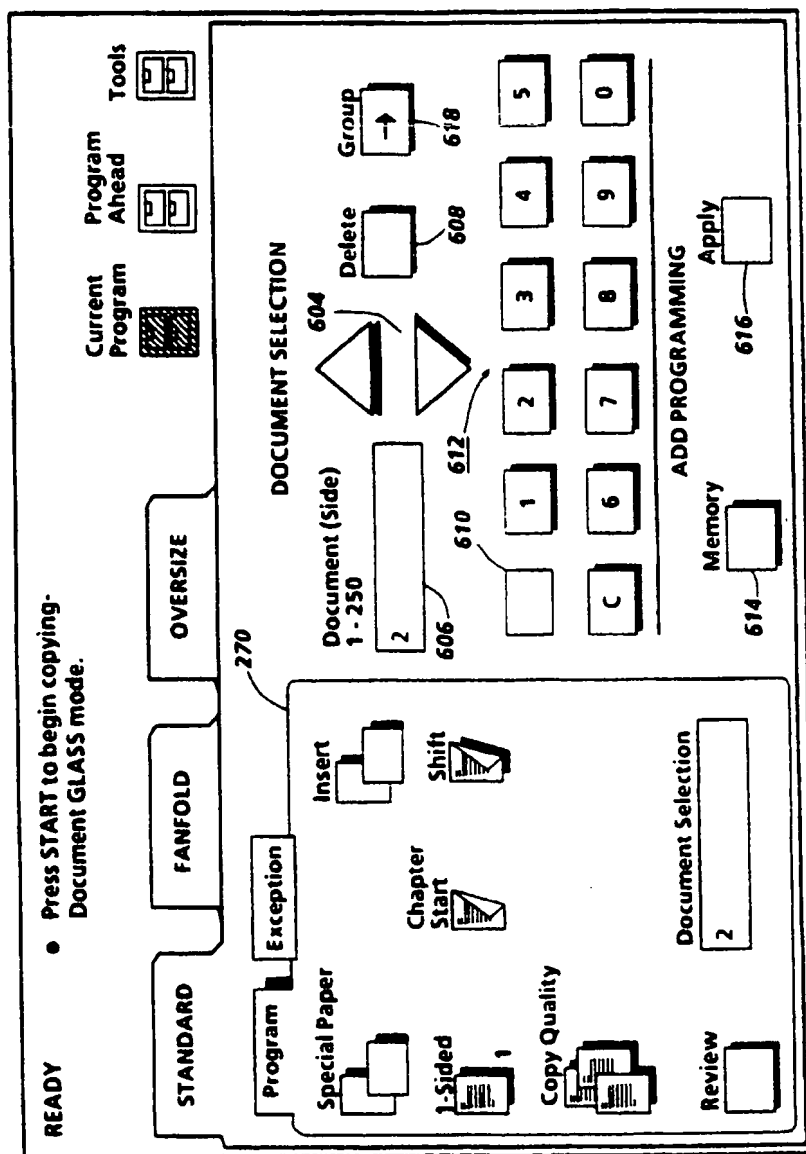


FIG. 6

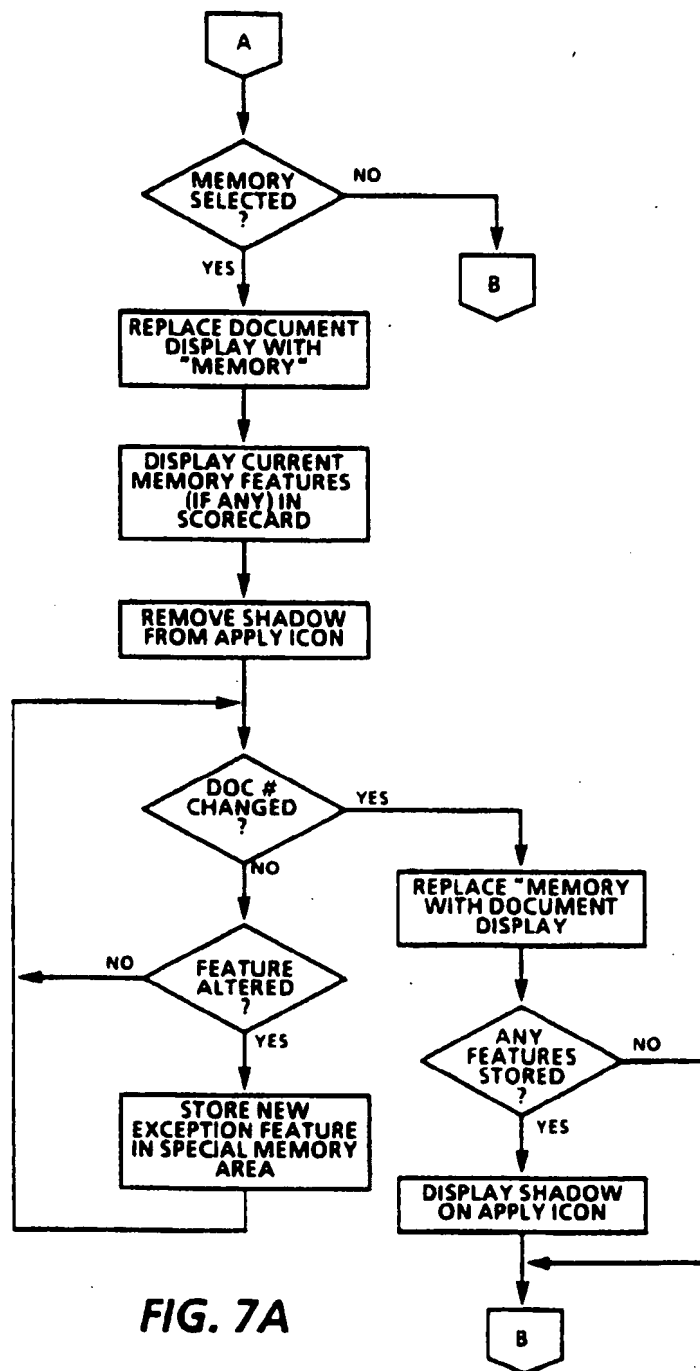
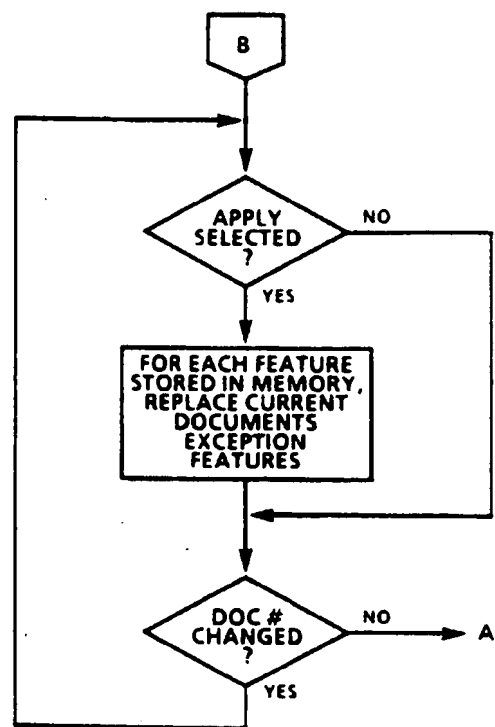


FIG. 7A



**FIG. 7B**





European  
Patent Office

## EUROPEAN SEARCH REPORT

Application Number

EP 91 11 3789

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.6)		
D,X	EP-A-0 331 329 (XEROX CORPORATION) * page 11, line 22 - line 28; figures 40-52 * -----	1,2	G 03 G 15/00		
			TECHNICAL FIELDS SEARCHED (Int. Cl.6)		
			G 03 G		
The present search report has been drawn up for all claims					
Place of search The Hague		Date of completion of search 18 February 92	Examiner LEISNER C.O.D.		
<table><tr><td><b>CATEGORY OF CITED DOCUMENTS</b> X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention</td><td>E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &amp;: member of the same patent family, corresponding document</td></tr></table>				<b>CATEGORY OF CITED DOCUMENTS</b> X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention	E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document
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